Reference # 2.

Resource Recovery

ONTARIO MINISTRY OF ENVIRONMENT
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A COMPREHENSIVE WASTE RECOVERY PROGRAM

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Ontario

Ministry of the Environment

Hon. William G. Newman, Minister

Everett Biggs, Deputy Minister

RESOURCE RECOVERY, ONTARIO

The Province of Ontario has undergone an expansion of population, of rapid urban growth, of the production and consumption of goods and energy without parallel. This has contributed greatly to the prosperity and well-being of the people of this province. Unfortunately, in common with other advanced industrial nations, these very successes have carried their own problems in their train.

One of the most critical problems facing us today is how to deal with the huge and growing volume of waste produced by our affluent society. On a broader scale, the urgent need for conservation of limited world resources has been dramatically emphasized by recent events.

A number of separate waste management programs have been developed in the short time since the province assumed responsibility in this field by The Waste Management Act of 1970.

We have now reached the point where these approaches can be integrated into a single comprehensive provincial program, which will use every means available to reach its goal in the shortest possible time.

That goal is to recover all of the valuable resources from the waste produced, and at the same time to eliminate unnecessary waste.

The provincial plan is designed to provide in three five-year stages all the facilities necessary for complete resource recovery, to serve at least 90 per cent of the population of the province, and all but eliminate the need for the landfill of waste.

(THIS PUBLICATION CONTAINS RECYCLED MATERIALS)

This can only be achieved by a major government effort but it will also require the cooperation of municipalities, industry and the public.

Before discussing the details of the comprehensive provincial program, a review of the background may be helpful.

Situation Before Legislation

The situation just four years ago, before the province, by legislation now incorporated in The Environmental Protection Act, took responsibility for the control of waste management activities, was most unsatisfactory.

More than 90 per cent of the waste produced was disposed of by landfill; generally, each municipality, and many industries, owned and operated a disposal site, or a number of sites, to serve only its own waste; many of such sites were open, burning dumps resulting in significant pollution and health hazards; and most waste management activities were completely unplanned, and established and operated without regard to social or environmental offense.

Regulatory Program

The first objective of the regulatory program was to improve this situation; first, by ensuring that all new sites and systems were located or established, and operated, to the required standards, and next, to develop with the owners individual programs to ensure that existing sites and systems would be upgraded, by acceptable stages to these same standards, or replaced at the earliest opportunity.

When waste management legislation came into effect in 1971, more than 2,100 disposal sites were in operation, of which less than 10 per cent could be considered satisfactory.

By October 1973, more than 500 of these had been closed and, of the 1,600 operating sites, 65 per cent were considered satisfactory.

Generally, the program has been characterized by flexibility in dealing with the very wide variety of types of operation, from the small rural dump to highly sophisticated landfills and incinerators. However, only limited further improvement can be expected solely by the enforcement of legislation.

Area Planning Studies

The cost of further improvement can only be reduced to an acceptable level by advance planning for complete waste management systems throughout a suitable geographical area without undue regard to political boundaries. Apart from this aspect, we realized that only by reducing the very large number of small, individual operations, and thus attaining the benefits and economies of scale, could new and improved treatment and disposal methods be introduced.

The next step in our program, therefore, was to encourage this advance planning by the provision of 50 per cent provincial grants, sixteen of these studies are now in progress, generally covering entire counties or regions of the province with a provincial subsidy to date of more than $250,000. A number of additional studies will commence this year and, when these are completed, proper planning, at least, will have been carried out for nearly 70 per cent of the population of the province.

HASTINGS COUNTY WASTE MANAGEMENT SYSTEM DEVELOPMENT

Present System

dump site

landfill site

System Recommended by Area Study

regional landfill

container transfer station

System After Implementation of Comprehensive Plan

front-end plant

regional transfer station

container transfer station

These programs will result in a marked reduction in the total number of landfill disposal sites in the province, principally due to the consolidation of a large number of small sites into a few very large central treatment facilities, which can be improved in stages, as reclamation processes and equipment become practicable, to resource recovery, rather than merely disposal sites. However, it is apparent that this final step cannot be taken without additional action by government.

Despite the extra efficiency to be gained by such measures, and by advances in collection, transportation and treatment technology, municipalities will still be faced with considerably increased costs; larger municipalities will have high capital expenditures and small municipalities disproportionately high operating costs.

Reuse and Reclamation

In parallel to these approaches, we have been considering the problems which will result from the continued uncontrolled increase in the quantities of waste produced, and the proliferation of types of material appearing in waste.

In the view of the Ministry, the only ultimate solution to the mounting problems of solid waste will require a substantial reduction in the quantity of waste produced, and the use of every means possible to encourage the recovery of resources from waste.

There are a number of basic approaches to achieve this objective, and action will have to be taken along all these lines to achieve success. This is a most significant point. It is a common misconception that the

development of municipal reclamation plants will be a complete solution. It will not, although it is certainly a very important element.

Reduction in the Quantity of Waste Produced and Restrictions on Materials which Eventually Become Waste

Action has already been initiated by government. Regulations under The Environmental Protection Act have prevented the use in Ontario of disposable plastic milk jugs, and the three-quart plasticized paper milk container.

The Solid Waste Task Force set up by the Ministry has submitted a report on milk containers to guide future action, and another report on beverage containers is now being considered with a view to possible government action.

A permanent body, the Ontario Waste Management Advisory Board, is being set up to deal with the problems arising both from existing packaging and new types which may be proposed, and specifically to investigate measures of reducing the quantity of waste produced.

Separation at Source

A number of projects have been completely funded or partially subsidized to develop information on the feasibility of home separation of waste, and the separate collection and reclamation of some commercial and industrial waste.

Central Reclamation Plants and Processing Facilities for Reclaimed Materials

A number of major projects are now being developed in this important field.

In considering waste as a resource material, its potential as a source of energy is promising as an interim measure particularly in view of recent developments. Three different approaches are being considered.

Waste Incineration as a Source of Steam for District or Process Heating or Cooling

As a result of the waste management area planning study for the Ottawa-Carleton region, the National Capital area, and the Quebec municipality of Outaouais, a central waste incinerator has been proposed, producing steam which would be fed into an existing district heating network. An almost identical proposal has been made by the City of Toronto.

Use of Pulverized Waste as a Fuel in Cement Kilns

Waste material such as glass and aluminum may have value in the production of cement. The cement companies are very interested in this possibility and we have been working to encourage further development.

'Watts from Waste'

This approach, which involves burning pulverized waste beneficiated by the separation of the glass and metal fractions for the production of power in generating station boilers, has been studied in detail. A joint project with Ontario Hydro and Metropolitan Toronto has been developed in detail, and we hope will proceed to the construction stage next year.

The technology for the separation of reusable material from waste has not been developed to the same degree as the technology for the recovery of energy, and the economics of the various processes, which depend on the marketing of reclaimed materials, is uncertain.

Ontario Reclamation Research

The Ontario Ministry of the Environment has, for this and other reasons, developed the concept of a resource recovery centre, which would incorporate a full-scale working reclamation plant.

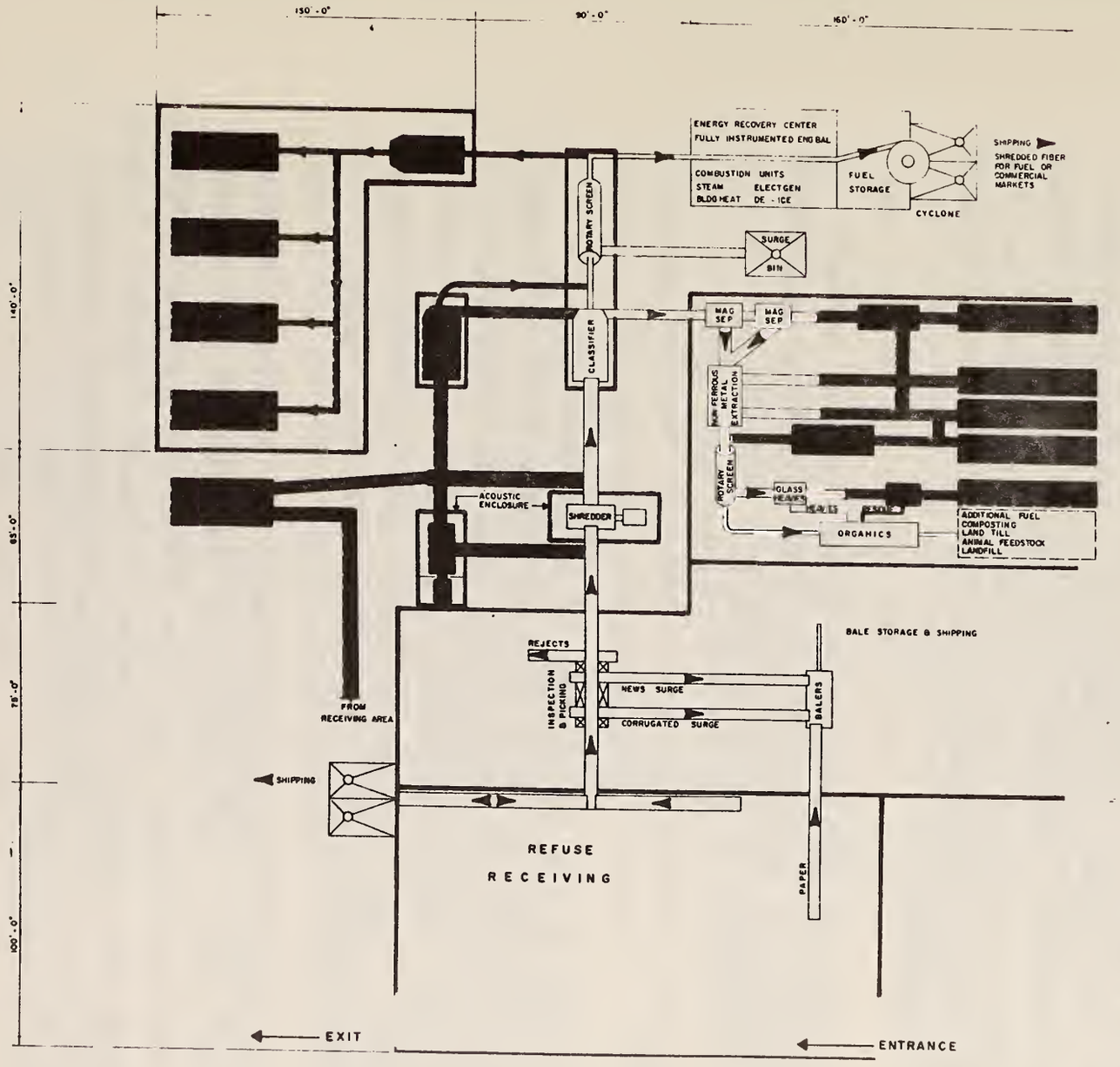
This will provide the capability of testing in practice any existing or new processes whose theoretical feasibility has been demonstrated, and equally important, will provide a reliable supply of reclaimed material for testing by industry, to determine its marketability either as separated or after further processing.

This is a most important development. It will be unique to Ontario; no comparable facility is available anywhere else in the world.

Organic Waste

Organic wastes, which include agricultural and food processing wastes, and the sludge from sewage treatment processes, are a major concern.

There is no question in our minds that a desirable approach is the return of this material, and the organic fraction of garbage, to the land as a soil conditioner. We have recently initiated a major program to encourage and control this method of utilization, though the program



LEGEND:

- INITIAL INSTALLATION
- FUTURE PROBABLE INSTALLATION
- PROBABLE BUILDINGS

EXPERIMENTAL WASTE RECLAMATION PLANT.

- DO NOT SCALE ALL DIMENSIONS APPROX -

THIS DRAWING WAS PREPARED BY KILBORN ENGINEERING LTD FOR THE EXPERIMENTAL WASTE RECLAMATION PLANT OF THE MINISTRY OF THE ENVIRONMENT, WASTE MANAGEMENT BRANCH AND MAY NOT BE USED FOR ANY OTHER PROJECT EXCEPT WITH PERMISSION IN WRITING FROM KILBORN ENGINEERING LTD

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DESCRIPTION REVISIONS DATE BY

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CLIENT: ONTARIO MINISTRY OF THE ENVIRONMENT

LOCATION: TORONTO CANADA

KILBORN

TITLE: 200 T/D EXPERIMENTAL SOLID WASTE RECLAMATION PLANT MODULE CONCEPT

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will be limited at this stage to processed sewage plant residues. The possibility of utilizing pyrolysis processes to produce gas or oil, or industrial chemicals will be investigated at the experimental plant.

Derelict Motor Vehicles

Since we estimate that there may be more than 400,000 derelict vehicles scattered throughout Ontario, their return for reclamation would represent a substantial conservation of resources. A detailed program is being developed to achieve this, including legislative controls and Government assistance, and three pilot projects have been completed.

Apart from the reclamation of steel from car bodies, the possibility of recovering the other materials used in car manufacture is being examined.

Litter

We are now in the third year of a substantial anti-littering campaign which includes educational programs, surveys and clean-up campaigns, with the objective of, ultimately, making littering a socially unacceptable practice. This program is linked with the studies on beverage containers by the Solid Waste Task Force.

We are proud of the progress which has already been made in this field. Our legislation has been used as a model for other provinces, and these innovative programs already underway make Ontario a leader in Canada. However, looking to the future, we have concluded that an even greater effort is necessary.

COMPREHENSIVE RESOURCE RECOVERY PROGRAM

Problems

Large municipalities, almost without exception, are unable to locate satisfactory disposal sites within their own boundaries, and are forced to seek locations in adjacent municipalities. This is, quite naturally, resented and bitterly opposed. The consequent delays have resulted in the very real danger that garbage will pile up in the streets, if a satisfactory solution cannot be developed.

The introduction of improved waste management systems for regions and counties of the province will result in the same problems on a much wider scale.

Moreover, the enforcement of waste management legislation has already imposed increased cost on all municipalities. Further improvement would result in prohibitive increases in operating cost for smaller municipalities and, particularly, for sparsely populated rural areas.

Apart from these immediate problems, but even more important in the long-term, is the urgent need for the conservation both of energy and material resources, and of land for necessary development, and especially for agricultural use. It is easy to say that these are international problems beyond our control. This may be so, but a beginning must be made somewhere, and it is entirely appropriate that the Province of Ontario should take a leading role, as it has done so often in the past.

The difficulties must not be underestimated. Although the development of technology has been proceeding very rapidly indeed over the past few years, it has not yet been proven for practical use. Pilot plants built to demonstrate the operation of particular proprietary processes or equipment are of very limited value.

Moreover, the development of new markets and new uses for the material separated from waste must proceed at the same pace as technological development if resource recovery from waste is to be of real rather than merely token benefit.

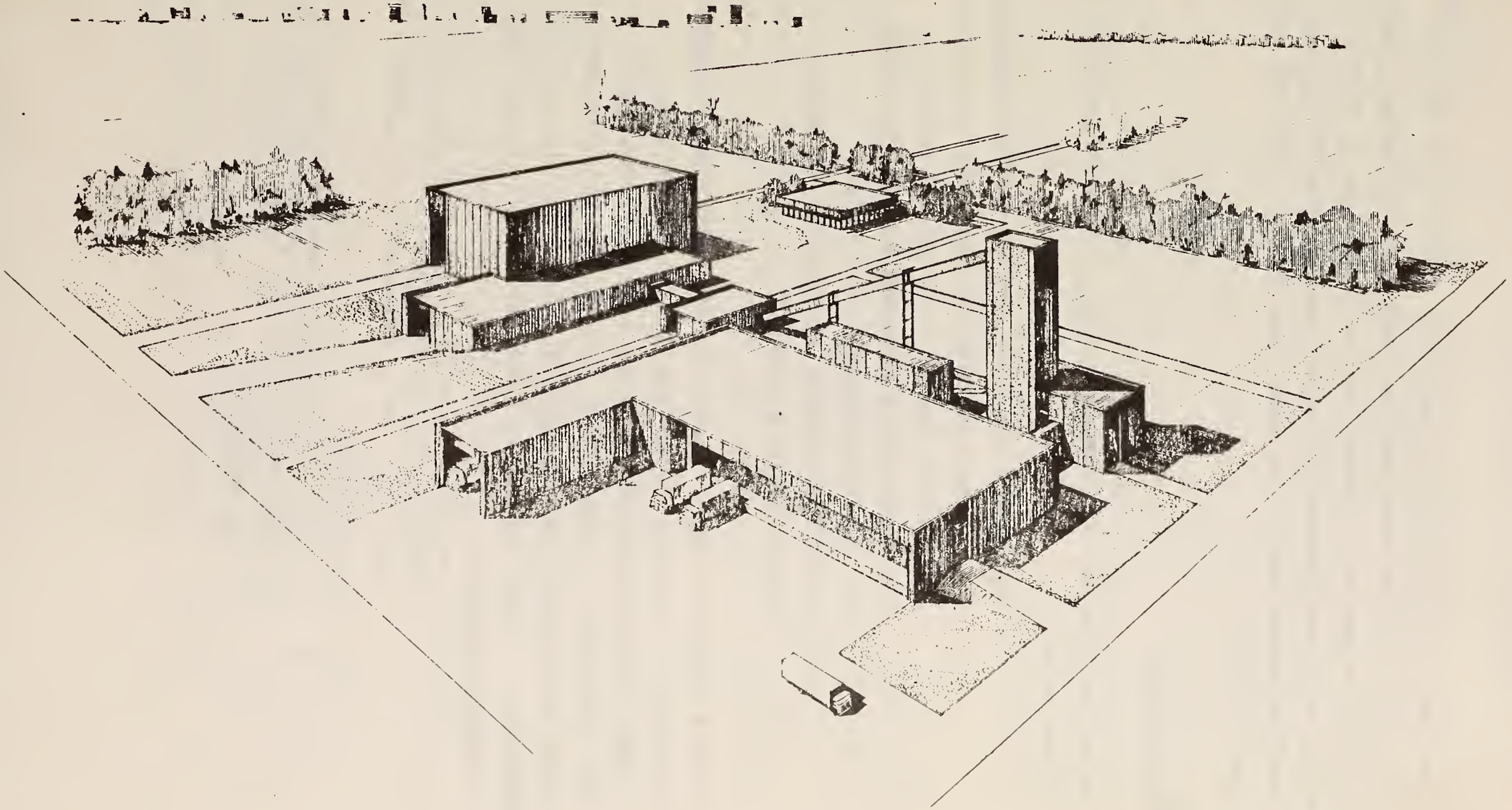
The comprehensive provincial program is designed to provide both short and long-term solutions to these problems, not just for metropolitan areas, but for municipalities of all sizes. It will integrate all existing related programs, and provide provincial leadership and control over their planned development in three five-year stages.

Related Programs

Two of the related programs already described are particularly significant.

The waste management planning studies, apart from providing essential basic data on the quantities and types of waste produced, will lead to the development of improved waste management systems. Generally, this will involve the replacement of landfill disposal sites by transfer stations and the use of efficient, long-haul transportation to carry the waste to a comparatively few central facilities.

The Ontario reclamation research centre, incorporating a full scale experimental reclamation plant, will be used to find and prove the technology for complete resource recovery. It will also provide a regular supply of separated material, of controlled quality, which is necessary for the development of markets and new uses for the separated waste material, and in addition will provide a training-ground for operators of future plants.



DISCIPLINE ARCHITECTURAL	CLIENT ONTARIO MINISTRY OF THE ENVIRONMENT	TITLE	
SCALE	DATE	200 T.P.D. EXPERIMENTAL SOLID WASTE RECLAMATION PLANT	
DESIGNED BY H. SCHIBEL			
DRAWN BY E.C. Kum	FEB. 74	PRELIMINARY ARCHITECTURAL	
CHECKED BY			
APPROVED BY			
LOCATION TORONTO ONTARIO			

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This facility will be in operation before the end of 1975. It is most encouraging that already great interest is being shown by industry in co-operating in this project, which will enable specifically Canadian technology and Canadian expertise to be developed in this new and rapidly growing field.

Objectives

The objectives of the comprehensive resource recovery program are:

1. to reduce the quantity of waste produced;
2. to recover to the greatest degree practicable the resource values in waste;
3. to reduce to a minimum the use of land for waste disposal;
4. to achieve these objectives at least cost to the public.

At this point in time, there are obviously many uncertainties in the details of any long-term program, and as much flexibility as possible must be retained to take advantage of unforeseen developments. However, there is no doubt with regard to the best general approach, at this point in time, bearing in mind that we must emphasize:

1. adaptability to all areas of Ontario;
2. capability for a 'staged' or 'modular' progression;
3. flexibility to enable new technology to be incorporated, or to take advantage of new markets.

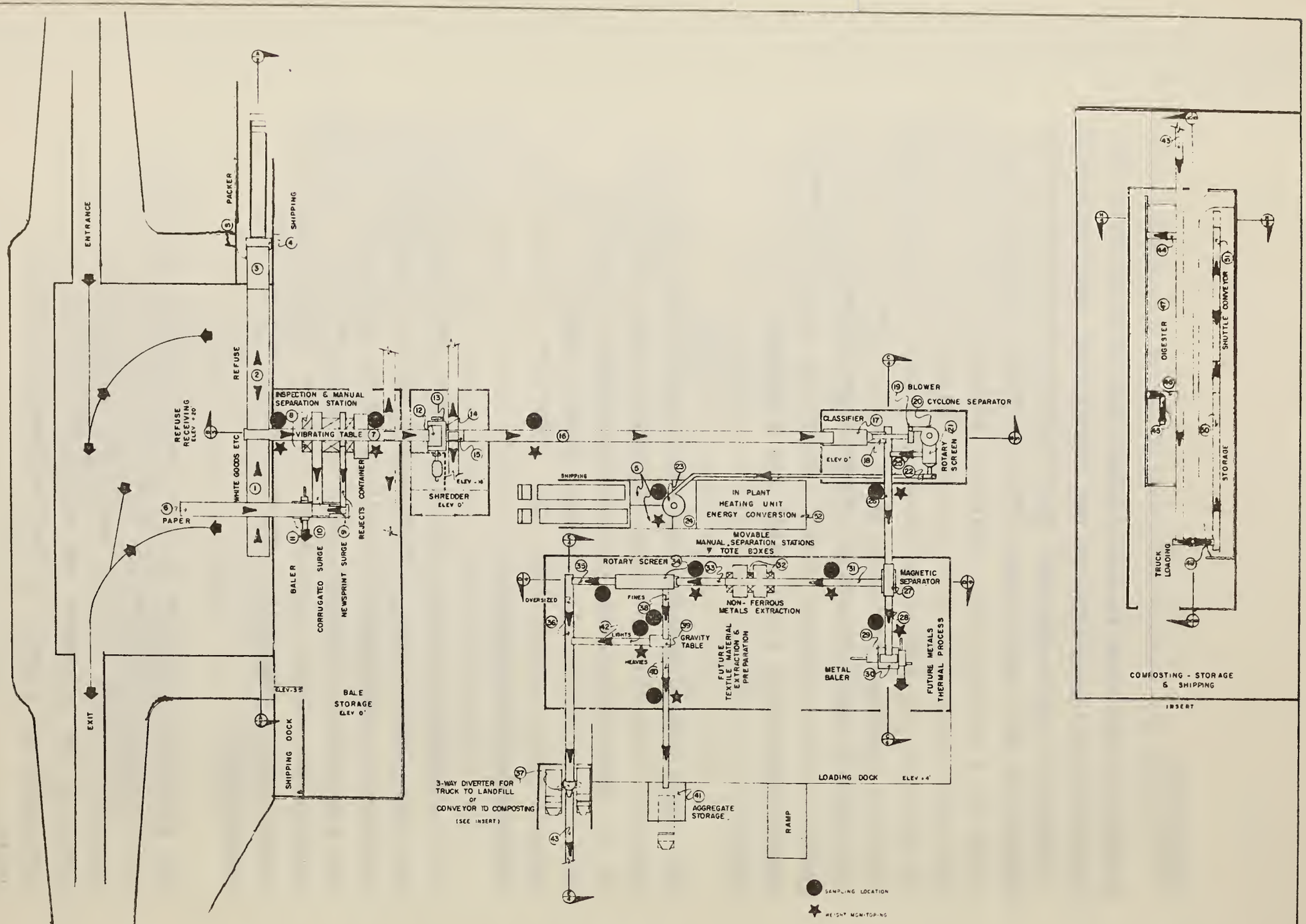
Technology

A complete resource recovery plant can be considered in two sections, generally called 'front end' and 'back end' processes. The technology for 'front end' processing is relatively well developed. This includes shredding the waste to a uniform size, magnetic separation of tin cans and other ferrous metals, and air classification processes to separate the remaining waste into two streams, a light fraction composed principally of paper fibre and plastic film, and a heavy fraction composed principally of non-ferrous metals, glass, organic material, plastics, and the miscellany of other materials which may be found in waste.

The 'back end' processes include a very large number of possible different options, directed at the separation of all these materials in different forms, depending upon the market to which they will be directed. The technology for these 'back end' processes is relatively undeveloped and unproven.

It is important to note that the 'front end' processes have many advantages in themselves, even if the material produced is subsequently landfilled, or incinerated for the production of energy, as an interim measure. Nuisance effects are almost eliminated, cost is reduced, and a proportion of marketable materials can be recovered immediately.

The provincial program will be based on this approach, which provides substantial benefits now, and is sufficiently flexible so that immediate advantage can be taken of new processes and equipment as they are developed and proven at the reclamation research centre.



PLAN VIEW

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CLIENT: ONTARIO MINISTRY OF THE ENVIRONMENT
LOCATION: TORONTO CANADA

KILBORN

TITLE
200 T/D EXPERIMENTAL SOLID WASTE RECLAMATION PLANT
MONITORING LOCATION

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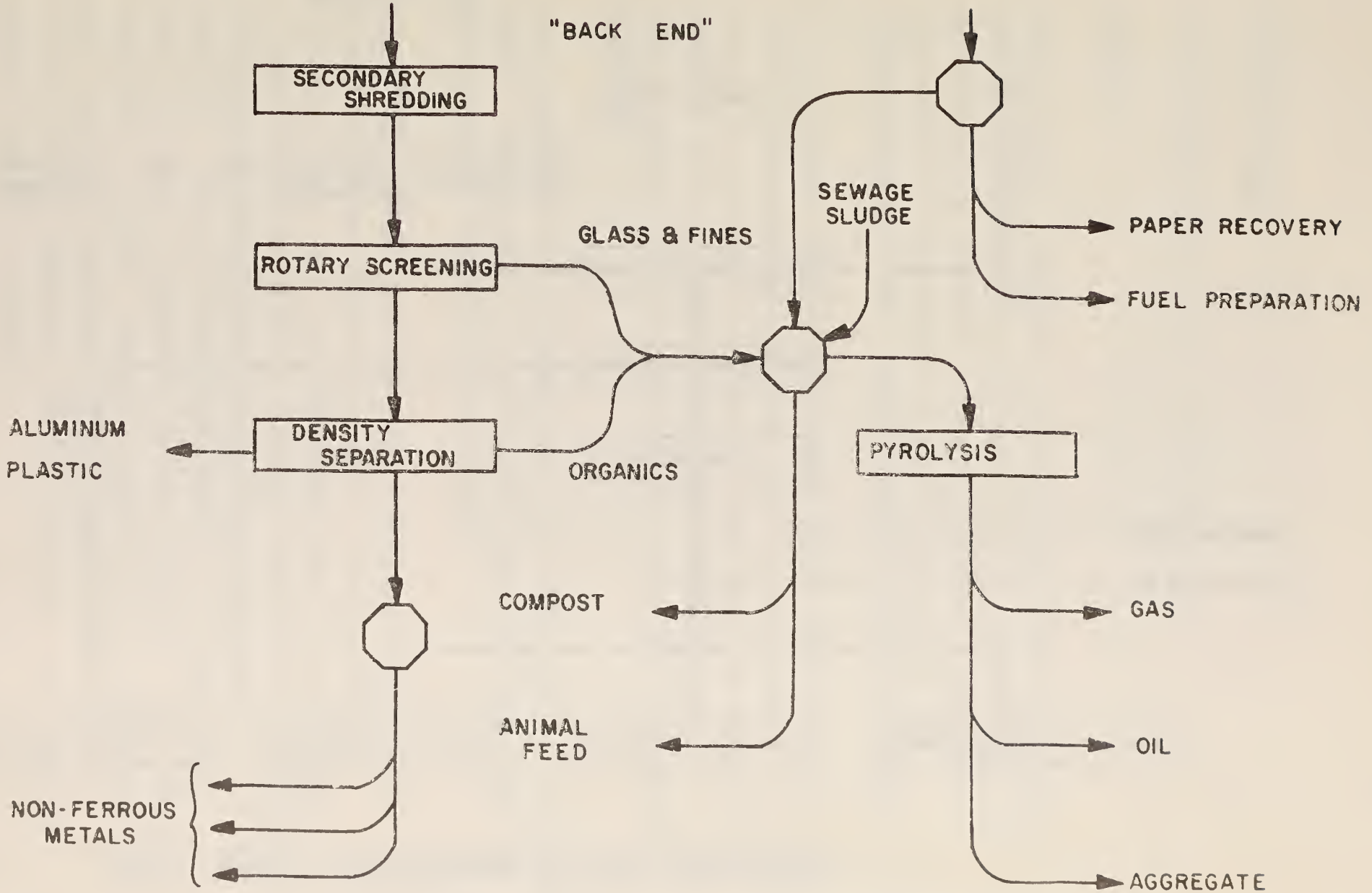
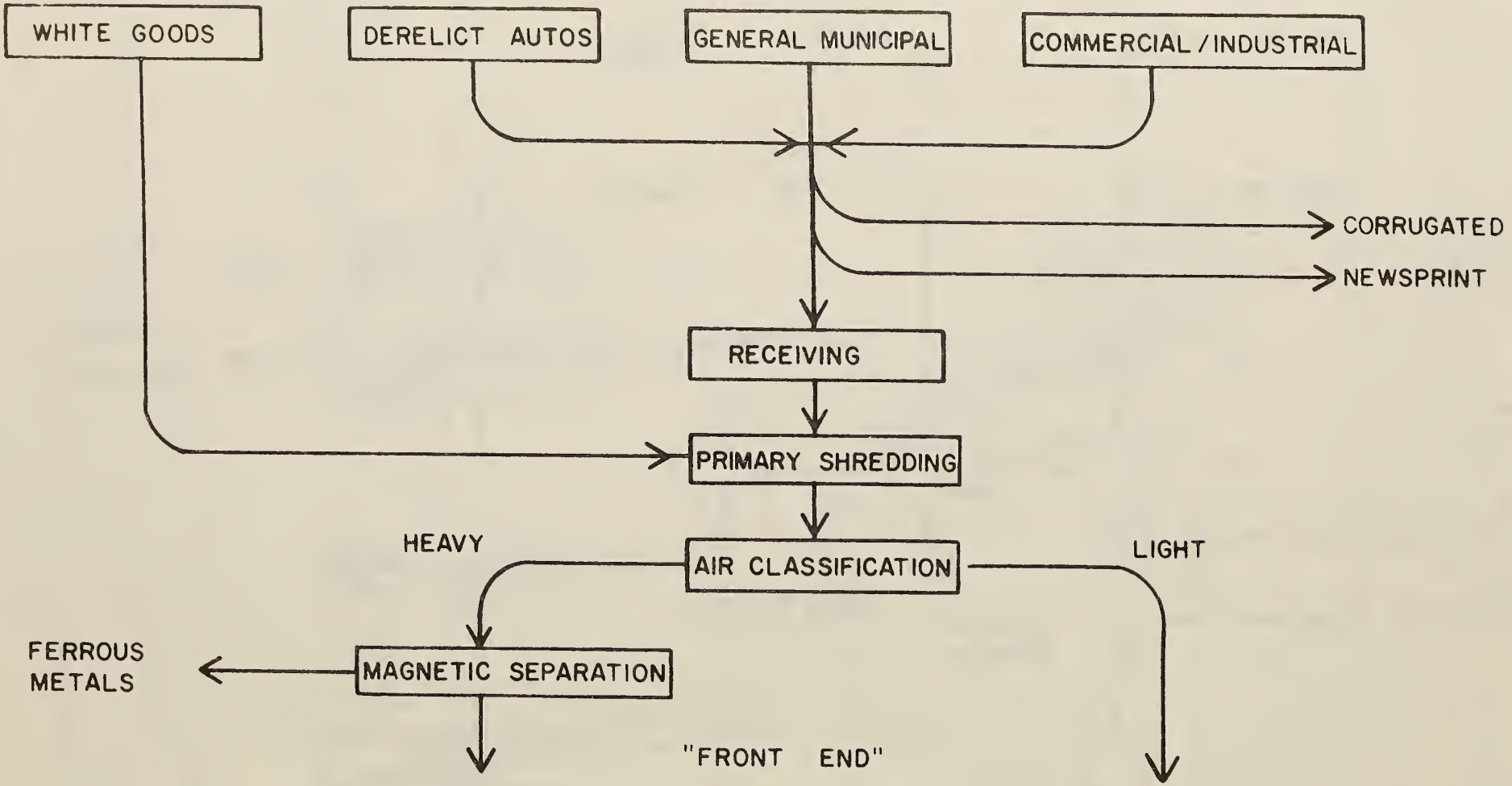
SOLID WASTE PROCESSING PLANT SCHEMATIC



FUTURE DEVELOPMENT

SOLID WASTE PROCESSING PLANT SCHEMATIC



INITIAL PLANT

Program Stages

The program covers three five-year stages.

Stage 1

During stage 1, between 1975 and 1980, waste management systems throughout the province will be improved by the replacement of disposal sites by transfer stations, so that disposal operations in a particular area are concentrated in a few, large sophisticated facilities.

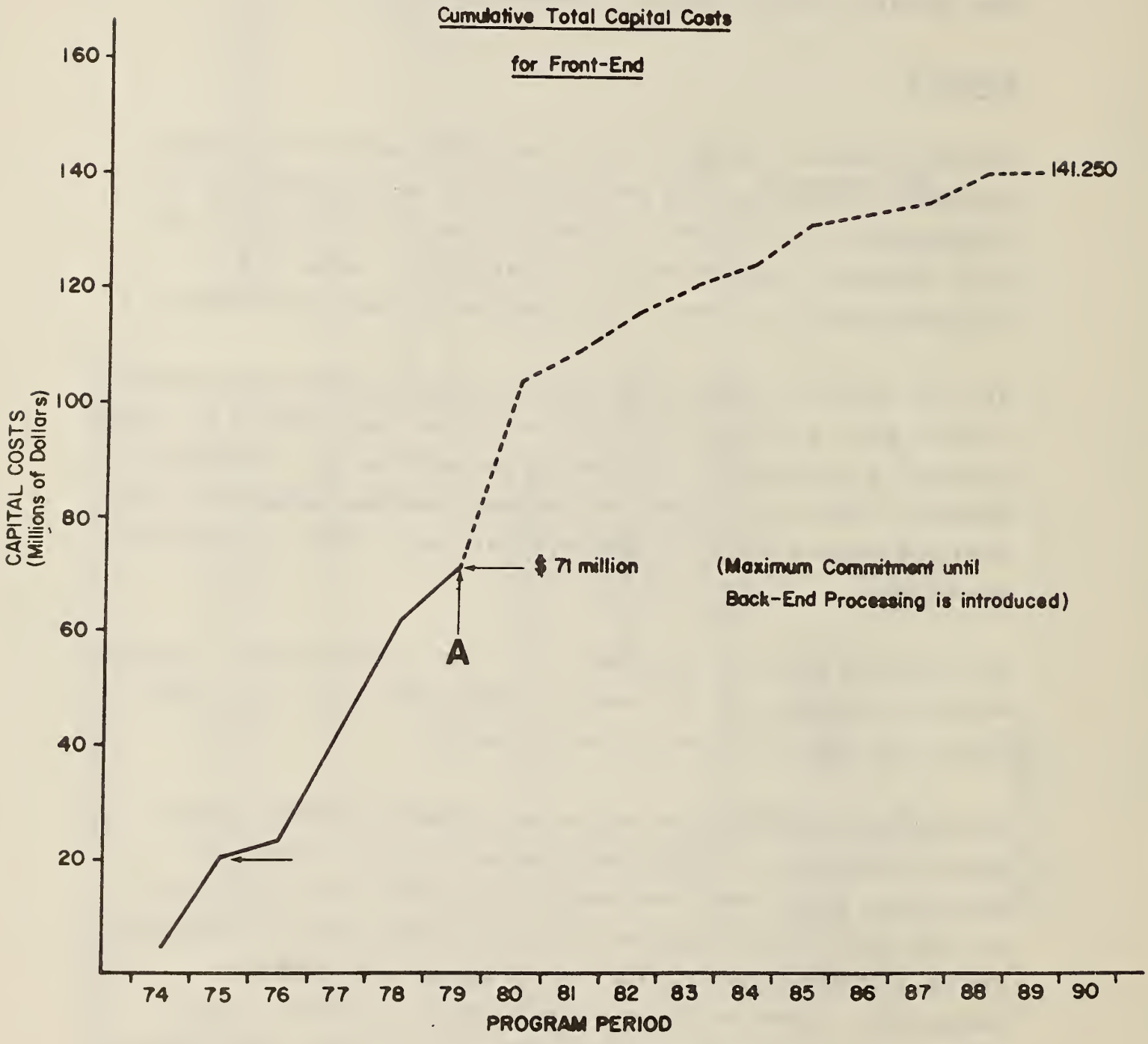
At the central facilities serving major population centres 'front end' processing plants will be installed. At those plants, a proportion of readily separable and marketable material such as corrugated paper, bundled newsprint, and ferrous metals will be removed for sale, and the remainder shredded.

Air classification equipment will be installed at locations where a use exists, or can be developed, for the light or heavy streams which will be produced.

During this period, we may also support certain large-scale demonstration projects as an interim measure providing that they are compatible with the objectives of the provincial program, and are sufficiently flexible to be incorporated within the program eventually. Generally, these will be experimental in nature, but which can only be proven in actual practice. The 'Watts from Waste' project, which is essentially a 'front end' plant using the separated light fraction as a fuel in existing power generating station boilers, is a typical example of such a project.

COMPREHENSIVE RESOURCE RECOVERY

PROGRAM FOR ONTARIO



Stage 2

During stage 2, between 1980 and 1985, the provision of transfer stations and transportation networks should be completed throughout the province, which will enable the remainder of the 'front end' plants needed to be constructed.

The full development of this concept is, however, contingent upon the improvement of long-haul transportation of waste, by the use of rail-haul for example.

During this stage, also, sufficient progress should have been made in process technology and market development to enable work to begin on the installation of proven 'back end' recovery processes.

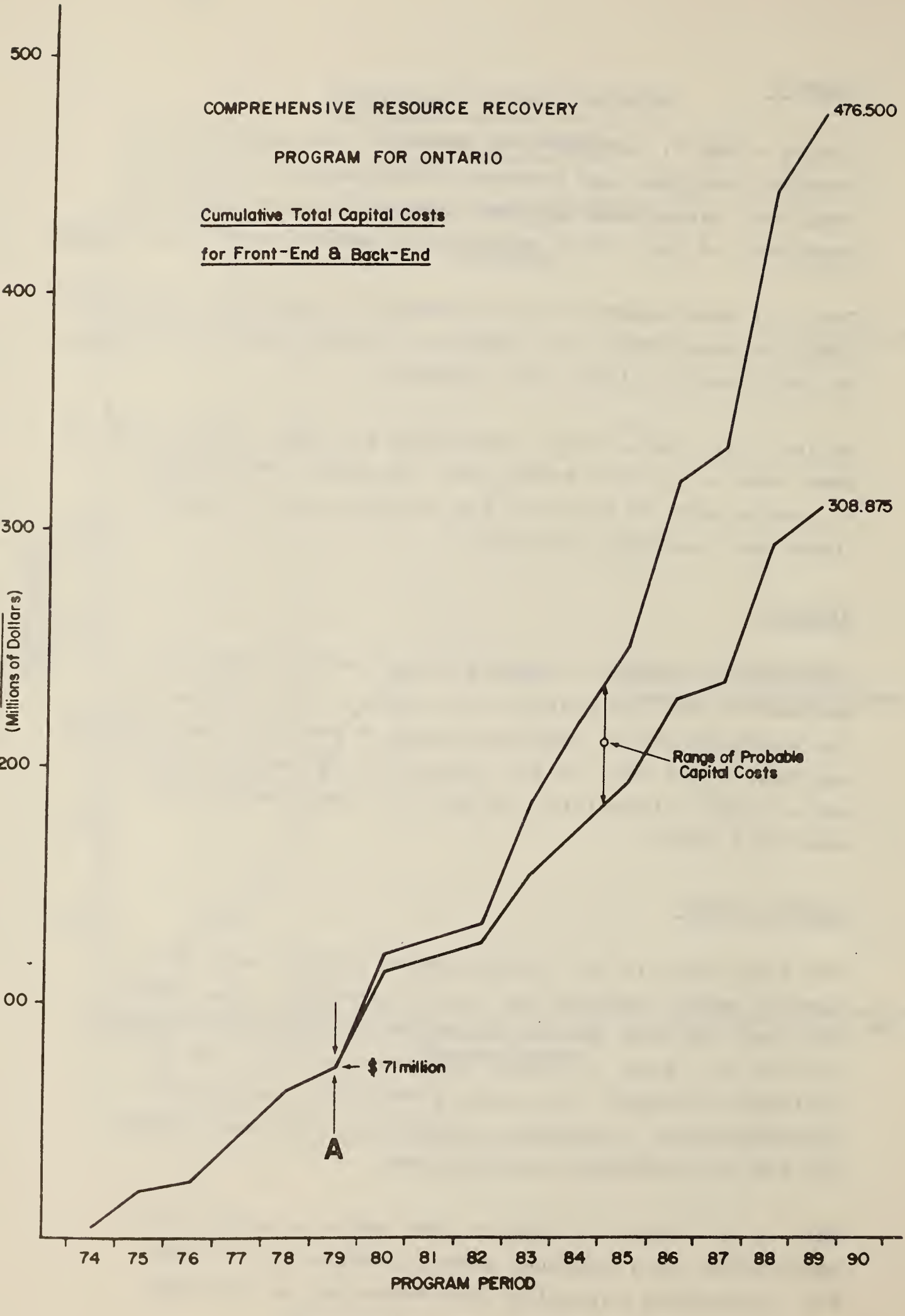
Stage 3

Finally, in the third stage between 1985 and 1990, we believe it will be possible to complete the program by the installation of complete resource recovery processes, serving 90 per cent of the population of the province, and all but eliminating the need for the landfill of municipal waste.

Systems Study

The first step in the comprehensive program will be a systems study covering the entire province. The study will use the data already obtained from the area planning studies as a base to obtain information on all of the variables involved - on waste production, collection, transportation, processing, marketing, cost and income, and the relationships between them.

This is an extremely complex task and will entail the development of a computer model, comparatively crude and approximate initially, but which can be reviewed and refined as the program is implemented.


COMPREHENSIVE RESOURCE RECOVERY
PROGRAM FOR ONTARIO
Cumulative Total Capital Costs
for Front-End & Back-End
476.500
308.875
Range of Probable
Capital Costs
$ 71 million
A
500
400
300
200
00
(Millions of Dollars)
74
75
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PROGRAM PERIOD

The study will provide guidance on the improvement of waste management systems to be incorporated in the overall program and on the location and capacity of transfer stations and processing plants. It will enable accurate forecasts to be made of capital and operating costs, and of income from the sale of recovered material.

Generally, it will provide the information necessary for the efficient and economic management of the program, and the rapid achievement of its objectives.

Waste Management Advisory Board

To this point, attention has been concentrated on the purely technical aspects of the comprehensive program. However, a major objective is to reduce the quantity of waste produced. Apart from this, it is unlikely that the other objectives can be fully achieved unless action is taken to minimize the misuse of materials which results in unnecessary waste or which may make it more difficult to recover these materials, and to investigate in depth all of the non-technical constraints which may operate to inhibit the economic use of recovered materials.

A Waste Management Advisory Board is now being set up to investigate and advise on these particular problems.

The extent and significance of the work which the board is being asked to do cannot be over-emphasized. It is essential that it be carried out in parallel with investigation into process technology at the resource recovery centre, and that very close liaison be maintained between the board, and the staff of the Ministry of the Environment responsible for the implementation of the comprehensive resource recovery program.

The membership and terms of reference of the board will be announced in the near future.

Front-end Processing Plants

However, these measures, although they are essential to the further development of the program, will not relieve the problems which many large municipalities are facing now.

In a number of areas, further study is not required before a decision can be made on the location and initial capacity of the 'front end' processing plants to be installed during the first stage of the comprehensive program.

We have offered to the municipalities involved to construct immediately six 'front end' processing plants. The entire capital cost will be provided by the Government of Ontario, fifty per cent being recoverable over a forty-year period, as an addition to the 'user charge' per ton of waste processed at the plants.

Four of the plants will initially serve primarily London, Kingston, Sudbury and Metropolitan Toronto. Two additional plants will serve, jointly, areas in Peel and Halton, and in Peel and Metropolitan Toronto.

The plants will vary in design capacity from 200 to 1,000 tons per day, and the total capital cost will amount to 17 million dollars.

Since some of the plants, even initially, will serve more than one municipality, the province, through the Ministry of the Environment, will retain ownership to ensure that their design and operation are compatible with the comprehensive provincial program, and to co-ordinate and develop markets for reclaimed materials.

Staff of the Ministry of the Environment are meeting with the municipalities involved to discuss details of the program. We hope that the day-to-day operation of the plants can be carried out by municipal staff, under a contract agreement with the municipality, or by a private company if the municipality prefers this approach. In any event, it is our intention to set up management co-ordinating committees in each area, which will include representatives of each municipality utilizing the plant.

Ministry staff will also be meeting with the private waste management companies and the recycling industry to discuss their role in the provincial program - and let me emphasize that we believe they will have a very significant role, both in the first stages of the program and increasingly in the future.

The provision of front-end plants alone does not pretend to be a complete solution to municipal waste management problems. However, we are convinced that it is a necessary first step, and a very substantial step, towards the complete solution which is the goal of the comprehensive provincial program. A proportion of the waste will be reclaimed for reuse immediately, and this, and the processing of the remainder, will reduce landfill requirements, the cost of transportation and landfill, and very substantially reduce disposal

Province Locations of Primary Waste Processing Plants

problems, even during the comparatively short time until further processing equipment for greater resource recovery can be introduced.

Subsidy Program for Small Municipalities

However, although the construction of 'front end' processing plants in the first stage of the comprehensive program will provide relief for large municipalities, small municipalities, and particularly sparsely populated rural areas, will continue to be faced with disproportionately higher cost in providing improved waste management facilities now, and at a later date, in integrating their facilities with the comprehensive provincial program.

Cost problems for small municipalities revolve around operating expenses, rather than capital costs, and this is the area where assistance is required.

The philosophy established in the provision of sewage treatment and water supply facilities should apply - essential services must be made available at reasonable cost to all residents of Ontario.

The systems study which will commence immediately and be carried out province-wide for the further development of the comprehensive program will obtain information now unavailable on the present and future costs of waste management for small municipalities.

As soon as this information is available, a decision will be made on the most effective means of assistance to ensure that the benefits of resource recovery from waste will be made available on an equitable basis.

This ambitious program is a logical development of the process which began with The Waste Management Act, 1970. It marks the most significant milestone in that process, integrating as it does many diverse programs to achieve a comprehensive approach to the management of waste.

No other jurisdiction has attempted to cope with the problems on the scale proposed by the Government of Ontario. We have decided that we cannot take the safe approach, and wait for others to take the risks. We are confident that this imaginative and innovative program will receive the full support and cooperation of the public, of municipalities, and of industry, and with this support, there is no doubt whatsoever that the program will achieve its goals.

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